

Exhibit A

EXPERT REPORT

ERIK LAYKIN

March 30, 2018

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

Case No. 16-cv-8794

GC2 INCORPORATED,

Plaintiff,

v.

INTERNATIONAL GAME TECHNOLOGY

et al.,

Defendants.

Subject to Revision
March 30, 2018

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EXPERT REPORT OF ERIK LAYKIN

I. EXECUTIVE SUMMARY

I was retained by GC2, Inc. (“**GC2**”), through its counsel, to serve as an expert witness in this matter. Specifically, I was asked to analyze and opine on the distribution and copying of digital artwork and graphics alleged to contain GC2’s copyrighted material. My background, described in Section II, below, contains my qualifications for serving as an expert witness in this case. In this report, I describe how the playing of certain digital interactive slot machine games, whether on a website, in a mobile app, or as part of a computer game, results in copies of said artwork and graphics being made on the particular device. I found that such copying does occur and this report will outline where these copies originate, what they consist of, where they are placed, and other information that exists behind the computer screen.

GC2 licensed its artwork to IGT to be used in “gaming machines” which I understand to be a term of art within the gaming industry which includes video slot machines that are installed in a fixed location, such as a casino floor; these gaming machines have been referred to in this case as land-based games (“**Land-Based Games**”).¹ GC2 alleges that IGT has gone beyond the scope of this agreement, and has developed and made interactive versions of games containing GC2 artwork and graphics available to consumers through its other distribution channels. For purposes of this report, I have been asked to assume that the artwork and graphics related to games discussed

¹ 7th Amendment to Agreement Dated January 10, 2003 between IGT and GC2

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1 in this report developed by GC2 are owned by GC2 and protected by registered copyright (“**GC2**
2 **Copyrighted Material**”). IGT’s distribution channels include websites and mobile apps for
3 Android and Apple phones.

4 DoubleDown Interactive LLC (“**DDI**”) offers a series of mobile apps which offer virtual
5 slot machines and other casino games on a free-to-play basis. These are published under the
6 DoubleDown Casino brand (“**DDC**”). The DDC apps are free, but when players exhaust their daily
7 allowance of casino chips they are invited to purchase more for real money. The app does not
8 allow the player to cash chips back out for real money, allowing DDI to avoid being classified as
9 a gambling operator. DDC is also available over the web, either as a standalone website or within
10 Facebook’s Games section.

11 DDC includes three of the games at issue in this matter, namely Pharaoh’s Fortune, Coyote
12 Moon, and Kitty Glitter. GC2 alleges that the versions of these slot machine games currently being
13 distributed by DDI contain GC2 Copyrighted Material. My investigation into DDC confirmed the
14 presence of these games, and established, through use of investigative and analytical techniques,
15 that copies of the artwork in question were being made and stored on users’ personal computers
16 and mobile phones.

17 I was also asked to analyze another important distribution channel used by IGT affiliates
18 operating in the online, real-money gambling casino space, including Caesars Interactive, operator
19 of CaesarsCasino.com (collectively “**Caesars**”). IGT affiliates offer online, real-money gambling
20 within the State of New Jersey, as well as Canada, Gibraltar and Alderney (the northernmost of
21 the inhabited Channel islands), where online gambling is legal.² Caesars is one of the IGT

² <https://www.igt.com/en/products-and-services/interactive/platforms/igt-rgs>

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1 affiliates providing these services in New Jersey.³ Like DDI, Caesars offers a website and a mobile
2 app, which also offer Pharaoh's Fortune, Coyote Moon, and Kitty Glitter.⁴ Like their DDI
3 counterparts, when the games are played for the first time, a set of copies of the GC2 Copyrighted
4 Material is transferred to the user's personal computer or phone. As the user continues to play the
5 game, the artwork is automatically recopied if necessary.

6 GC2 Copyrighted Material has further been incorporated into computer games distributed
7 by Masque Publishing, Inc. ("**Masque**"), which are sold on CD-ROM and which contain versions
8 of various slot machine games designed to be played for fun on a user's personal computer. These
9 games do not require an Internet connection for basic game play. These discs also contain copies
10 of the GC2 Copyrighted Material, including Pharaoh's Fortune, Lucky Lionfish, Wild Goose
11 Chase, Festival Fantastico, Kingpin Bowling, and Maid of Money. The CD-ROMs containing the
12 games are still listed for sale on Amazon.com and other retailers.⁵

13 I can use the DDC Web and mobile apps and the Web and mobile apps available from
14 operators affiliated with IGT Interactive to play games contain GC2 Copyrighted Material.
15 Because I can play these games at a public location, such as a Starbucks coffee shop, while I am
16 seated with a friend, my understanding is that these websites and apps result in a public display
17 and a public performance of the GC2 Copyrighted Material, which would violate 17 USC §106.

³ <https://www.igt.com/en/products-and-services/interactive/platforms/igt-rgs>

⁴ <https://www.linkedin.com/company/caesars-interactive-entertainment-inc-/>

⁵ See e.g. https://www.amazon.com/IGT-Slots-Diamond-Galaxy-Download/dp/B00OS87P7Q/ref=sr_1_21?ie=UTF8&qid=1522198629&sr=8-21
or

<https://www.walmart.com/ip/IGT-Slots-Diamond-Galaxy-Actual-casino-slot-machines-from-the-world-s-leading-slot-machine-manufacturer-IGT-By-Masque-Publishing/947236752>

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1 Furthermore, I observed that the games in question carry copyright and trademark
2 ownership information indicating that the intellectual property is owned by IGT, notwithstanding
3 GC2's claim of copyright ownership of the artwork and graphics displayed beside the copyright
4 ownership information, and other places throughout the game.

5 In the process of distributing the aforementioned games, IGT, through its affiliates, binds
6 players casually playing these slot machine games to a terms of use document that obliges them to
7 indemnify IGT. Simultaneously, IGT claims that it has the rights to disseminate the game on these
8 platforms. I understand that this places IGT's players in the precarious position of being asked to
9 indemnify a multi-billion-dollar corporation against copyright infringement claims such as the one
10 in this case, while that same multi-billion-dollar corporation, IGT, misleads them as to the
11 provenance of the games.⁶

12 A glossary of terms used in this report is attached hereto as **Exhibit A**.

⁶ https://www.google.com/search?q=NYSE:IGT&tbm=fin#scso=uid_i-y6WvHEHMTTjAOhqrKwBg_5:0

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II. QUALIFICATIONS

I am over the age of 18 and competent to provide this Expert Report. I have personal knowledge of the facts stated in this Expert Report, except those stated on information and belief, which I am informed and believe to be true. If called upon, I could and would testify to the following matters, and I reserve the right to update, modify, and append to this report as additions and information are made available to me.

I am a Managing Director and Practice Chair of the Global Data Risk practice of Duff & Phelps, LLC (D&P), an independent consulting firm of approximately 3,500 professionals, which provides litigation, financial, restructuring, and operational consulting services to government agencies, legal counsel, and companies in a variety of industries. I have been employed by D&P since July 2008, and am based in its Los Angeles, California office.

I have played an active role in the development of the Computer Forensic, Cyber Security and Electronic Discovery industry since the mid-1990's, and I am very familiar with a variety of software technologies, computer systems, programming languages, computer forensics, and electronic discovery systems, and standards of practice within the eDiscovery industry. I have managed hundreds of investigations, electronic discovery matters, computer forensics matters, technology and cyber investigation matters on behalf of plaintiffs and defendants involved in lawsuits pending in state and federal courts throughout the United States and abroad. I have also managed a variety of these matters and investigations on behalf of corporations seeking to resolve internal investigations into employee malfeasance, fraud and operational errors. These investigations have required my reporting to Boards of Directors, Audit Committees,

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1 Management, Investors and outside regulators such as the Federal Trade Commission, the
2 Securities and Exchange Commission and others.

3 The matters which I have worked on have been in a wide variety of industries and include
4 software, Internet security, Internet information, and other technology fields in the United States
5 and abroad. In addition, I have consulted on, and responded to matters involving the theft of Trade
6 secrets, cybersecurity, programmatic failures, employee fraud and malfeasance, foreign state
7 espionage, intellectual property, information privacy, and fraud / hacking matters spanning the last
8 20 years.

9 I have provided expert training on the topics of Computer Forensics, Cyber Crime,
10 Electronic Discovery, Internal Investigations, and Best Practices for Employee Monitoring to
11 numerous organizations including the FBI (Federal Bureau of Investigation), the ABA (American
12 Bar Association), the HTCIA (High Tech Crime Investigation Association), AICPA (American
13 Institute of Certified Public Accountants), the Governments of the United Kingdom, Malaysia, the
14 United Arab Emirates, Republic of Taiwan, the Special Administrative Region of Hong Kong, and
15 the People's Republic of China.

16 From 2004 through 2008, I was the Founder and Director of the Information Technology
17 Investigations practice group and on the Management Committee of the Discovery Services
18 practice group at Navigant Consulting, Inc. (NYSE: NCI). In this role, I led teams of professionals
19 that provided investigations, electronic discovery, computer forensic and investigative consulting
20 services for a wide variety of national and international clients.

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1 From 1997 to 2004, I served as President and Founder of Online Security
2 (OnlineSecurity.com) which was one of world's first providers of commercial cyber security
3 investigations and computer forensic services to the legal and business community for the
4 investigation and resolution of disputes.

5 As part of my work at Online Security, I managed and/or constructed the initial Computer
6 Forensic service offerings and established standards on behalf of important traditional
7 investigative agencies in the United States and Asia, including The Investigative Group
8 International, Kroll & Associates and Pinkerton Consulting & Investigations.

9 In addition, I was responsible for assisting clients in the development of database-driven
10 software applications and online data management systems. I managed the negotiation of data
11 hosting services for large enterprise-wide Internet based initiatives. I had direct responsibility for
12 numerous initiatives including software integration, email hosting, Web application development
13 and hosting, online marketing, and the development of custom database-driven technology
14 solutions for online and traditional applications and businesses.

15 I have developed, managed, and hosted large-scale, secure web-enabled projects for clients
16 including The State of California, HealthAddress.com, Sony Studios, The Government of Hong
17 Kong, Warner Brothers, Disney Studios, Toyota, Porsche, Veterinarian Centers of America,
18 Latham & Watkins, Kroll & Associates, California Manufacturing Technology Center, The
19 Government of Alsace, The Government of France, ICN Pharmaceuticals, and The Richemont
20 Group.

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1 Over the years, I have participated on several advisory boards, including the California
2 Department of Insurance Anti-Fraud Task Force, The Electronic Commerce Council, and The
3 State of California's Judicial Council Subcommittee on Digital Evidence. I am a past President
4 and Director of the Pacific Rim for the FBI's Infragard program, a Fellow of the Academy of Court
5 Appointed Masters, and on the Board of Directors of the Forensic Expert Witness Association. In
6 addition, I am a Co-Chair of the American Bar Association's Computer Forensic Expert Witness
7 Subcommittee and am active with a variety of other committees. I am a frequent presenter at
8 international conferences on the topics of Cyber Security, Computer Forensics, Electronic
9 Discovery, Personal Privacy, and Technology Fraud and Crime by external sources or internal
10 trusted actors.

11 In addition to my consulting work I am also an author of numerous articles, co-author of
12 two books and the sole author of *Investigative Computer Forensics* published by John Wiley &
13 Sons. In 2017, *Who's Who Legal* selected me as the leading Forensic Litigation Consultant in
14 North America and in 2018 selected me as a "Thought Leader" at the "Pinnacle of the Profession"
15 in the field of Digital Forensics.

16 I have served as an expert witness and investigator and have been appointed Special Master
17 to the court in complex cases involving information technology and the disputes that arise from its
18 usage within a business and network environment on numerous occasions. My Curriculum Vitae
19 is attached as **Exhibit B**.

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III. SCOPE OF ASSIGNMENT

I was retained by the law firm of Greensfelder, Hemker & Gale, P.C. on behalf of GC2 to study and opine on the movement and copying of artwork and graphics for which GC2 has asserted a claim of copyright infringement. A Materials Relied Upon list, attached hereto as **Exhibit C**, sets forth the materials I relied upon for this report.

I was also asked to study and opine upon:

- Methods and technology used by IGT to distribute its games over the Internet, from IGT's server, through casino operator websites, to end-user players.
- Methods and technology used by DoubleDown Casino to distribute its games to end-user players on mobile and desktop devices through applications for desktop computers and mobile devices.
- Methods and technology used by Masque Publishing, Inc. to distribute games to customers via the company's website and on CD-ROMs offered for sale by Amazon and other retailers.
- The content of copyright information displayed on screens visible to end-users during game play on the DoubleDown Casino and IGT Interactive Web and mobile apps.
- Whether I would classify, as a technology expert, an instance of playing the games in question on the IGT Interactive web-based and mobile apps and/or the DoubleDown Casino web-based and mobile apps as a Public Display and a Public Performance as those terms are defined in 17 USC §101 if I was playing the game in a public place with a friend.

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1
2 My team and I have been pursuing this investigation for over a year. To gather data to
3 further my investigation, my team and I traveled to or used local Duff & Phelps personnel to collect
4 data in California, New Jersey, Toronto, Florida, Massachusetts, and Illinois. Using the data we
5 gathered, my team and I examined multiple software apps on multiple computing platforms and
6 analyzed the artwork and software on systems including Android, iOS, Windows, and the Web to
7 ascertain how and where the artwork and graphics at issue in this case were copied and stored.

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IV. INTRODUCTION: GC2 ARTWORK AND IGT GAMES

GC2 is an Illinois-based corporation that has, since 1999, produced graphics, artwork, music, and gameplay logic for slot machines and other Casino games. On its website, GC2 notes that it has produced artwork used in over 87,000 video and mechanical slot machine games that sit on casino floors around the world.⁷

International Game Technology PLC is an English company listed on the NYSE as IGT. International Game Technology is a Nevada Corporation having a principle place of business in Reno, NV and is a wholly-owned subsidiary of the English company. IGT is a wholly owned subsidiary of International Game Technology and will be hereinafter referred to as (“IGT”). In this report I will refer to the collective corporate entities under International Game Technology PLC (England) as “**The IGT Companies.**” At the time of this writing, The IGT Companies have a market capitalization of nearly \$5.5 billion.⁸ The IGT Companies employ over 12,000 people in offices worldwide, including Rome, Italy; Reno, Nevada; Providence, Rhode Island; and London, England.⁹

Central to this matter is the distribution and use of artwork and graphics that were originally licensed for use in video slot machine games. Video slot machine games are present on the floor of almost every casino in the world. The first video slot machine was developed in 1976 by Fortune Coin Co. in California.¹⁰ Data published by the Gaming Technology Association in 2012 indicates that there are approximately 6.9 million slot machines in use worldwide.¹¹

⁷ <http://www.gc2inc.com/>

⁸ https://www.google.com/search?q=NYSE:IGT&tbm=fin#scso=uid_-6W5WrKtGIjujwP0wZ6oAw_5:0

⁹ <http://phx.corporate-ir.net/phoenix.zhtml?c=119000&p=irol-irhome>

¹⁰ https://en.wikipedia.org/wiki/Slot_machine#History

¹¹ http://gamingta.com/wp-content/uploads/2016/10/World_Count_of_Gaming_Machines_2012.pdf

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1 A traditional mechanical slot machine, as depicted below in Figure 1, features 3 or 5
2 spinning reels that each contain some number of symbols. The classic slot machine contains
3 various images of fruit on these reels, giving rise to the name “fruit machine.” A player pulls a
4 lever on the side of the machine, causing the reels to spin. The reels come to a stop at random
5 positions, and winning combinations trigger payouts.¹²



6
7 Figure 1: The reels and symbols on a classic three-reel mechanical slot machine.¹³

8 Mechanical slot machines have a number of limitations, notably that the number of
9 combinations on a three-reel machine is limited, meaning that jackpots must be capped relatively
10 low in order for the machine operator to profit. For example, on a hypothetical three-reel machine
11 with 10 symbols per reel, the maximum number of possible combinations is 1,000, meaning that,

¹² https://en.wikipedia.org/wiki/Slot_machine#Reels

¹³ Photo Credit: Garry Knight; <https://www.flickr.com/photos/garryknight/3814492332>

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1 on a \$1 bet, the operator cannot return more than \$1,000 on the jackpot. This scenario, of course,
2 leaves no profit for the operator, and would require that the other 999 combinations return no
3 payout.

4 In contrast, modern video slot machines are not limited by the physical size of the reels,
5 and instead present virtual imagery reminiscent of the original mechanical machines. It is very
6 easy for a game manufacturer to field a three-reel game with 256 symbols per reel, giving over 16
7 million possible positions.¹⁴ From there, an operator can offer a \$1 million jackpot on a \$1 bet and
8 still have other payouts while maintaining a profit margin; statistically the \$1 million jackpot
9 would only be paid out after \$16 million had gone into the machine. In almost all jurisdictions
10 where gambling is legal, the software controlling game outcomes, which is based upon a “random
11 number generator,” is closely regulated by the relevant gaming authority.¹⁵

12 A quick glance at the typical casino floor will show you that slot machines are not marketed
13 based on their random number generator. It is a slot machine’s artwork and concept that draws in
14 players. Slot machine designers and casino operators construct narratives around their slot
15 machines, often incorporating familiar characters and archetypal symbols designed to garner
16 excitement and mystery. Prominent slot machine games include those based on popular media
17 (Wheel of Fortune, The Addams Family), satirical narratives (The Godfather) and mystique
18 (Coyote Moon’s American West theme and Pharaoh Fortune’s exploration of Ancient Egypt).
19 Figure 2 shows video slot machines on the floor of a major casino in Asia, note the bright symbols
20 and flashing lights.

¹⁴ On a three-reel game with 256 symbols per reel, the number of possible combinations is $256^3 = 16,777,216$

¹⁵ See, e.g. <https://support.skyvegas.com/s/article/Random-Number-Generator-Sky-Vegas>

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Figure 2: Slot machines on the floor of the Venetian Casino in Macau, c. 2015.¹⁶

GC2 began licensing artwork and graphics, as well as themes, for video slot machine games to IGT in January of 2003. The license granted to IGT allowed GC2's artwork and graphics to be used in Land-Based Games; GC2's artwork and graphics were never licensed to IGT for Internet based or mobile device-based games.¹⁷ Paragraph 3.2 of the original agreement between the parties granted IGT the "sole and exclusive worldwide right and license to make, manufacture, use, market, and sell gaming equipment (using the IGT Platform)" and defined the IGT Platform to mean "IGT electronic gaming machines and conversion kits that utilize an IGT provided circuit board featuring an Intel 80960 microprocessor." In the 7th Amendment, executed in January of 2007,¹⁸ GC2 and IGT took steps to wind-up their relationship, which included a license to IGT to

¹⁶ Photo Credit: Ian Robertson; <https://www.flickr.com/photos/134874952@N07/19262053844>

¹⁷ Agreement between IGT and GC2 dated January 10, 2003, IGT NV_000003; See also Complaint Exhibits 18-20

¹⁸ Complaint Exhibit A, 7th Amendment to Agreement Dated January 10, 2003 between IGT and GC2, p. 2

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1 distribute an unlimited number of GC2 projects on “gaming machines,” a defined term in that
2 agreement, which did not include “non-wagering devices, machines, and systems, such
3 as...general purpose computers, for non-wagered gaming;”¹⁹ or “wagering devices, machines, and
4 systems:...devices used for mobile gaming...and Internet gaming.”²⁰

5 In its 2017 Annual Report to shareholders, IGT wrote that it “must offer products that
6 appeal to gaming operators and players. [IGT’s] revenues are dependent on the earning power and
7 life span of its games, putting constant pressure on [IGT] to develop and market new game
8 content.”²¹ With this in mind, one can see why IGT redeveloped GC2’s artwork into a series of
9 games that could be played online and on mobile phones, as is alleged in this case. (In fact, the
10 same IGT annual report notes that IGT “cannot provide assurance that its products do not infringe
11 the intellectual property rights of third parties.”)²² Mobile video games generated over \$46 billion
12 in revenue in 2017,²³ a figure roughly equivalent to the GDP of Lithuania, a country of 2.8 million
13 people.²⁴

14 Historically, GC2 would deliver artwork, graphics, and playable demos to IGT, IGT would
15 integrate the artwork and graphics into their own playable games using their game engine.²⁵ A
16 game engine is a term of art throughout the video gaming industry which refers to the underlying
17 software program used to build a game.²⁶ In the case of a slot machine, the game engine typically
18 contains logic that positions symbols on reels, spins the reels, stops the reels, and manages payouts

¹⁹ Complaint Exhibit 20, Section 1

²⁰ See id.

²¹ <http://phx.corporate-ir.net/phoenix.zhtml?c=119000&p=irol-irhome>

²² <http://phx.corporate-ir.net/phoenix.zhtml?c=119000&p=irol-irhome>

²³ <https://newzoo.com/insights/articles/the-global-games-market-will-reach-108-9-billion-in-2017-with-mobile-taking-42/>

²⁴ [https://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(nominal\)](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal))

²⁵ 7th Amendment to Agreement Dated January 10, 2003 between IGT and GC2

²⁶ https://en.wikipedia.org/wiki/Game_engine

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1 and probabilities.²⁷ Specific game artwork, logic, and payout rates can be layered on top of this
2 game engine to form the final game.²⁸

3 The files that make up a final game deliverable include artwork, graphics, wireframes,
4 audio, and Par sheets, which are spreadsheets containing the game's payout mathematics.²⁹ IGT
5 employees based in Reno would utilize proprietary game engine software to make games that
6 would play on IGT's specialized electronic gaming machines ("EGM"), i.e. video slot machines.³⁰
7 IGT utilized the artwork it received for the EGM version of the games to later develop its
8 interactive offerings and also to develop the mobile device-based games offered by DoubleDown
9 Casino and other IGT affiliates.³¹

10 In April of 2016, subsequent to the winding up of the contracts between IGT and GC2,
11 Todd Nash of IGT informed GC2's President and CEO, Frank Warzecha, that IGT had launched
12 interactive and/or mobile versions of Kitty Glitter in March of 2010, Pharaoh's Fortune in May of
13 2012, and Coyote Moon in May of 2012.³² Nash advised Warzecha that IGT was interested in
14 acquiring the rights to use GC2's artwork and graphics for interactive versions of these games.³³
15 Nash stated in an email to Warzecha: "upon further review, we have realized that somehow this

²⁷ <https://v-play.net/doc/how-to-make-a-slot-game-tutorial/#we-need-a-slot-machine>

²⁸ <https://v-play.net/doc/how-to-make-a-slot-game-tutorial/#we-need-a-slot-machine>

²⁹ "A par sheet is a document that details how a particular slot machine is designed, including the pay table, reel strips, and any other pertinent information to rules of the game." -

https://wizardofodds.com/gambling/glossary/#par_sheet; Often expanded as "probability accounting report."

³⁰ Kastner 30(b)(6) deposition, p. 24-25; Shorrock Deposition, p. 22

³¹ Defendant IGT's Second Supplemental Responses to Plaintiff's First Set of Interrogatories, Response to Interrogatory Number 15

³² Complaint Exhibit 1, p. 2

³³ Complaint Exhibit 1, p. 2

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1 gap in rights slipped through the cracks and these games were brought to interactive.”³⁴ Central to
2 this case is the fact that GC2 has not granted IGT such a license.

3 As I will discuss in the sections to follow, IGT and IGT’s affiliates have distributed myriad
4 content that contains the GC2 Copyrighted Material. At the time of this writing, GC2’s claimed
5 material is publicly available on the web, both in the form of free-to-play games³⁵ and as raw
6 artwork,³⁶ as well as via channels provided by Google,³⁷ Apple,³⁸ Facebook,³⁹ Amazon,⁴⁰ and
7 Samsung. GC2’s alleged artwork is also incorporated into content distributed by IGT licensees for
8 real-money online gambling in jurisdictions where that is legal.⁴¹

9 GC2 alleges public display and performance of its works, and the distribution of its
10 copyrights without associated credit and copyright ownership information. As I discuss below,
11 potentially hundreds of millions of copies of the GC2 Copyrighted Material have been made by
12 IGT, IGT’s affiliates, IGT’s licensees, and their customers. These customers, in turn, are subjected
13 to terms of use for IGT’s products that obligate them to indemnify IGT against copyright and
14 trademark claims. IGT simultaneously presents these players with GC2’s artwork while displaying
15 IGT’s copyright and trademark notice, with no reference to GC2. Based on what I have seen
16 displayed on the player’s screen as I played and analyzed the games at issue in this matter, IGT’s

³⁴ Complaint Exhibit 1, p. 2

³⁵ <https://www.doubledowncasino2.com/login>

³⁶ https://m-resource.doubledowncasino2.com/games/mobile/1.0.1/mobile/assets/art/1136x640/common/slots/coyotemoon/spritesheets/coyotemoon_slot2.png

³⁷ <https://play.google.com/store/apps/details?id=com.ddi>

³⁸ <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

³⁹ <https://apps.facebook.com/doubledowncasino/>

⁴⁰ <https://www.amazon.com/DoubleDown-Casino-Slots-Video-Blackjack/dp/B0081JPTXK>

⁴¹ <https://www.caesarscasino.com/games/slots/pharaohs-fortune/play/free/>

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- 1 customers are not made aware that they are potentially infringing upon GC2's copyrights while
- 2 casually playing these games.

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**V. DISTRIBUTION CHANNELS AND RESULTING SYSTEMATIC COPIES
OF GC2 COPYRIGHTED WORKS**

A. Social Gaming - DoubleDown Casino

1. DoubleDown Casino Relationship to IGT

DDI's flagship app, DoubleDown Casino, is an online social gaming casino which reaches users through Apple's App Store, Google's Play Store, Samsung's Galaxy Apps store, Amazon's Appstore, and the Web, including through Facebook's games section.⁴² DoubleDown Casino is currently one of the 40 highest grossing games on the Google Play app store for Android (despite the app itself being free to download).⁴³ Listings for the app on the Google Play store advertise "hit IGT slots"⁴⁴ and Apple's App Store advertises the app as offering "IGT hit slots straight from Vegas."⁴⁵

Indeed, IGT and DDI often operate as if they were one company. IGT not only provides the games that DoubleDown relies upon, but also controls the further licensing and distribution of those games by DoubleDown.⁴⁶ IGT and its subsidiaries collectively owned DDI and its affiliates from 2012 to 2017.⁴⁷ IGT gave interactive games, including Pharaoh's Fortune, Coyote Moon, and Kitty Glitter, to DDI.⁴⁸ IGT controls the access of all of its subsidiaries, including DDI, to IGT's games.⁴⁹ Beyond merely deciding which subsidiary will receive a license for IGT's games,

⁴² Complaint Exhibit 21.

⁴³ <https://play.google.com/store/apps/collection/topgrossing>

⁴⁴ <https://play.google.com/store/apps/details?id=com.ddi>

⁴⁵ <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

⁴⁶ Kastner 30(b)(6) Deposition, p. 330.

⁴⁷ From 2012 to 2017, DoubleDown Casino ("DD Casino") was distributed by DoubleDown Interactive BV ("DDI BV"), a Polish company. After the transition to the DoubleDown Interactive LLC ("DDI LLC") corporate structure in June of 2017, DD Casino was subsequently distributed by DDI LLC.

⁴⁸ Kastner 30(b)(6) Deposition, p. 102, 144-145, 320, 542.

⁴⁹ Kastner 30(b)(6) Deposition, p. 321-322.

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1 IGT also influences in which jurisdictions its games are offered by its subsidiaries.⁵⁰ In the case
2 of DDI, IGT also appears to control whether DDI licenses IGT's games to other business entities.⁵¹
3 DDI must also obtain IGT's permission if it wants to create any sequels to the games it has licensed
4 from IGT.⁵² IGT even pays DDI's vendors and provides for DoubleDown's accounting, legal and
5 customer service costs.⁵³

6 As I will discuss below, DoubleDown Casino makes uses of content hosted on Amazon
7 Web Services ("AWS"), a commercial service offered by Amazon Inc.⁵⁴ I understand that IGT
8 and DDI's then-parent company, DoubleU Diamond LLC ("**DoubleU**") entered into an agreement
9 on May 31, 2017 that required that DoubleU enter into a contract with AWS and pay AWS directly
10 to host certain servers on IGT's behalf and "in a manner that provides [IGT] sole and complete
11 operational control and access." I understand that this includes what I will refer to below as the
12 "DDC Gameplay Server."⁵⁵

13 IGT's influence over DDI extended to what art was used in the games DDI offered its
14 players.⁵⁶ IGT wanted DDI's version of the games to look like the Land-Based Games they
15 represented.⁵⁷ Like the Land-Based Games, some of the art files which IGT provided to DDI for
16 the Coyote Moon and Pharaoh's Fortune games originated at GC2.⁵⁸ As part of IGT's licensing
17 of games to DDI, IGT makes representations and warranties to DDI that IGT has the rights to the

⁵⁰ Kastner 30(b)(6) Deposition, p. 320.

⁵¹ Kastner 30(b)(6) Deposition, p. 329-330.

⁵² Sigrist Deposition, p. 225-226.

⁵³ Sigrist Deposition, p. 272-276.

⁵⁴ Defendant DoubleDown Interactive LLC's First Supplemental Response to Plaintiff's First Set of Interrogatories, Supplemental Response Number 3.

⁵⁵ Sigrist Deposition Exhibit 87, p. 12; Kastner Deposition Exhibit 661, p. 7.

⁵⁶ Kastner 30(b)(6) Deposition, p. 190.

⁵⁷ Kastner 30(b)(6) Deposition, p. 189-190.

⁵⁸ Kastner 30(b)(6) Deposition, p. 146.

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games it provides.⁵⁹ However, as discussed in Section IV, in April 2017, IGT approached GC2 to obtain the rights to the artwork and graphics for GC2's Pharaoh's Fortune, Kitty Glitter, and Coyote Moon, which by that time had already been brought "to interactive" by IGT.⁶⁰

According to DoubleDown, more than fifty-one million people created accounts to play DoubleDown Casino between May 2013 and December 2017.⁶¹ This figure reflects both DoubleDown's website, as well as the Android and iOS versions of the game. The actual number of times that DoubleDown Casino was downloaded or accessed is likely higher, as this figure only includes user accounts created, and does not appear to encompass those who downloaded the apps or accessed the website and played various games without creating an account.⁶² Additionally, one account could presumably be used on both the website and the mobile apps.

2. DoubleDown Casino App for Android

Attribute	App Marketplace	App to Phone	Open App 1 st Time on Device	Play Game 1 st Time on Device	Open App 2 nd Time on Device	Play Game 2 nd Time on Device
TERMS OF USE	None	N/A	Computer code with link to Terms of Use automatically downloaded by app. Link to Terms of Use presented in menu.	N/A	Link to Terms of Use presented in menu.	Link to Terms of Use presented in menu.
COMPUTER CODE CONVEYED	N/A	APK application package sent	N/A	Computer code indicating how images should be assembled from sprite sheets, where they should be placed on the screen, how they should move, etc.	N/A	Computer code redownloaded if necessary.
IMAGES CONVEYED	N/A	2x "tournament" Sprite Sheets	Multiple sprite sheets each containing multiple images.	Multiple sprite sheets each containing multiple images.	Sprite sheets redownloaded if necessary.	Sprite sheets redownloaded if necessary.
ANY IMAGES DISPLAYED	N/A	N/A	Game icons displayed to player.	Game, including game play graphics, displayed.	Game icons displayed to player.	Game, including game play graphics, displayed.
COPYRIGHT OWNERSHIP INFORMATION DISTRIBUTED	N/A	N/A	Link to Terms of Use presented in menu.	Server distributes computer code and graphics files with copyright information. Copyright ownership information displayed while game loads.	Link to Terms of Use presented in menu.	Computer code and graphics files with copyright information redownloaded if necessary. Copyright ownership information displayed while game loads.
POTENTIAL NUMBER OF DEVICES IMPACTED	N/A	10 million or more app downloads.	Number of apps opened - potentially 10 million or more	Precise figure needed from IGT.	Precise figure needed from IGT.	Precise figure needed from IGT.

⁵⁹ Sigrist Deposition, p. 118.

⁶⁰ Complaint Exhibit 1, p. 2

⁶¹ Defendant DoubleDown Interactive LLC's Supplemental Response to Plaintiff's Revised Financial Interrogatories, Response Number 5; Exhibit A.

⁶² Defendant DoubleDown Interactive LLC's Supplemental Response to Plaintiff's Revised Financial Interrogatories, Response Number 5

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a. Background

The Double Down Casino app is available from Google Play, an app store which is operated by Google and is the official app store on most Android devices (“**Play**”).⁶³ There are approximately 107 million active Android devices in the United States.⁶⁴ Like almost all modern smartphones, the Android mobile operating system includes an app store, where users can download apps for their smartphone, such as games, productivity apps, and others. DDC apps are also available on Apple’s App Store, Amazon’s Appstore, and Samsung’s Galaxy Apps store.

As of March 19, 2018, the app “**Double Down Casino – Free Slots**” is available for Android on Play (“**DDC Android App**”).⁶⁵ It is listed at version 3.16.28, and Play indicates that it has been installed between 10 million and 50 million times (Play does not publicly report installation figures with greater granularity).⁶⁶ It is offered on Play by Double Down Interactive LLC.⁶⁷ To conduct the tests described below, my team and I downloaded and installed this application on a Google Nexus 5X phone (“**Android Test Phone**”) that had just been wiped and reset to a factory default state, running Android version 6.0.1.

b. Network Traffic Analysis

Prior to downloading the DDC Android App, my team and I set up a system to analyze the network traffic going to and from my Android Test Phone using a network analysis tool called Fiddler 4, published by Telerik AD.⁶⁸ This allows us to inspect and review data that gets transferred to my Android Test Phone, which I would expect would be the same on any Android

⁶³ https://en.wikipedia.org/wiki/Google_Play

⁶⁴ <https://www.statista.com/statistics/232786/forecast-of-android-users-in-the-us/>

⁶⁵ <https://play.google.com/store/apps/details?id=com.ddi>

⁶⁶ <https://play.google.com/store/apps/details?id=com.ddi>

⁶⁷ <https://play.google.com/store/apps/details?id=com.ddi>

⁶⁸ <https://www.telerik.com/fiddler>

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1 device when a user downloads and then plays games on the DDC Android App. In order to
2 facilitate this, we created an encryption certificate using the Fiddler 4 tool and installed it on my
3 Android Test Phone, marking it as a trusted “certificate authority,” allowing us to use the Fiddler
4 4 tool to analyze encrypted traffic between my Android Test Phone and servers on the Internet.⁶⁹
5 This allowed us to also intercept and analyze communications between my Android Test Phone
6 and the Internet that made use of industry standard TLS encryption.

7 After the DDC Android App was launched, my team and I observed network traffic sent
8 to and received by my Android Test Phone with Fiddler 4. There were two primary Internet
9 locations my Android Test Phone communicated with while the app was running. The first was
10 “**ap-two.doubledowncasino2.com**” which is a location within Amazon Web Services.⁷⁰ Amazon,
11 through the AWS product line, is the largest provider of commercial cloud-based services in North
12 America.⁷¹ Daily, AWS handles more than 35% of North American Internet traffic.⁷² I will refer
13 to this location as the “**DDC Gameplay Server**,” although typical architectures for these systems
14 will make use of a collection of servers. The traffic to and from the DDC Gameplay Server was

⁶⁹ A certificate is a cryptographic marker affirming that a third-party has confirmed that one end of an Internet communications exchange is being conducted by the registered owner of the affiliated Internet domain. The way that a user engaged in an Internet transaction knows that it is talking to Amazon.com is that a trusted third party such as Verisign has issued a “certificate” to Amazon, Inc. affirming that Amazon, Inc. owns Amazon.com and the server in question is in fact operated by Amazon. In this case, we are attempting to impersonate Amazon Cloudfront in order to decrypt the messages coming from my Android Test Phone, and therefore must create our own certificate authority. In the normal course of operation, a trusted third party, such as Verisign or Google, would act as the certificate authority. In this case, we are intercepting otherwise encrypted traffic, and therefore are not eligible to receive a certificate from Verisign or Google, and therefore have manually installed our own. See https://en.wikipedia.org/wiki/Certificate_authority

⁷⁰ In other exchanges, the URL was “ap-one.doubledowncasino2.com”. In my experience, it is not uncommon for services of this kind to use multiple addresses for their servers. This makes it easier to handle increases in users as the load is split between multiple servers. See <https://en.wikipedia.org/wiki/WWW2>.

⁷¹ <http://www.zdnet.com/article/cloud-providers-ranking-2018-how-aws-microsoft-google-cloud-platform-ibm-cloud-oracle-alibaba-stack/>

⁷² <https://www.theguardian.com/technology/2017/feb/02/amazon-web-services-the-secret-to-the-online-retailers-future-success>

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1 primarily structured in a standard data format known as **JSON**. JSON stands for JavaScript Object
2 Notation and it is widely used on the Web for communicating data between Web browsers or apps
3 and Internet servers in a way that is easily interpreted by a computer.⁷³

4 Based on the content of the JSON data we observed, the data being sent to and from the
5 DDC Gameplay Server was primarily data related to game operations, such as which games are
6 available to be played. Based on what I observed, once a game is selected by the player and the
7 media assets – including images, artwork and graphics files -- are loaded, communications to the
8 DDC Gameplay Server consist primarily of signals that the user has hit the button and “spun” a
9 particular slot machine game, and responses from the DDC Gameplay Server indicating the current
10 state of each slot machine reel as well as how much the player has won or lost. In most video slot
11 machine games, a reel is a spinning element modeled after mechanical spinning reels – the video
12 slot machine is a simulation of a traditional mechanical slot machine.⁷⁴

13 Simultaneously, I observed network traffic to and from “**m-resource.**
14 **doubledowncasino2.com**”, which is another server within an AWS service known as Cloudfront.
15 I will refer to this server as the “**DDC Media Server.**” Cloudfront is a Content Delivery Network
16 (“**CDN**”), which is a collection of servers designed to deliver data to users very quickly.⁷⁵ This is
17 accomplished by placing said data on servers that are near population centers, and then sending
18 the data to the user from a nearby server. We observed that, as the DDC Android App was

⁷³ <https://en.wikipedia.org/wiki/JSON>

⁷⁴ https://en.wikipedia.org/wiki/Slot_machine#Video_slot_machines

⁷⁵ In my experience and testing, content within Cloudfront can be updated relatively quickly from a centralized dashboard. Information transmitted by DDC from the Cloudfront service indicated that the imagery was originally uploaded to another AWS service called S3. I tested this behavior within an AWS account under my team’s control, and found that once updated media content was uploaded to S3, the new content automatically distributed and was available globally within 24 hours.

launched and a game was played for the first time, a large amount of data was downloaded from the DDC Media Server to my Android Test Phone.

⁷⁷ https://en.wikipedia.org/wiki/Portable_Network_Graphics

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1 Figure 3: Sample Sprite Sheet downloaded from the DDC Media Server. The “Pharaoh’s
2 Fortune” icon is visible in the middle of the top row. Please note that the image was
3 received from the server in this orientation.

4 Additionally, I observed music, fonts, and JavaScript files being downloaded from the
5 DDC Media Server. The music was being downloaded inside “.dat” container files and was
6 delivered in the Ogg audio format.⁷⁸ I listened to the files, and they consist of gameplay music
7 and sound effects used when the slot machine game is being played.

8 A font is a set of digital shapes, usually letters, in a single, unified display style, scalable
9 to different sizes.⁷⁹ The fonts I observed in the DDC Android App were being distributed as
10 TrueType, a widely-used format for distributing fonts.⁸⁰ By way of example, this document is
11 typeset in the Times New Roman font.

12 JavaScript is a programming language which is very common in Web applications.⁸¹ It is
13 one of the only programming languages that Web browsers, such as Firefox and Chrome,
14 automatically understand and interpret. Within the JavaScript files downloaded from the DDC
15 Media Server, I observed computer code that set forth the coordinates of the sprites within the
16 sprite sheets my team and I had located, as described above. By enumerating the coordinates of
17 each sprite, this JavaScript code serves to identify and render each individual sprite. In concert
18 with other code, also downloaded from the DDC Media Server, this software handles the
19 placement of graphics on the mobile phone screen, as well as their animation and interactivity.

⁷⁸ <https://en.wikipedia.org/wiki/Ogg>

⁷⁹ https://en.wikipedia.org/wiki/Computer_font

⁸⁰ https://en.wikipedia.org/wiki/Computer_font

⁸¹ <https://en.wikipedia.org/wiki/JavaScript>

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Based on my experience with Web applications and Internet communications, the use of an independent server for communicating game play data and another server for distributing large media files is a common and accepted architecture. This allows for the game servers to more readily support large numbers of simultaneous players.

In testing, when the Coyote Moon slot game was launched for the first time on the DDC Android app, a number of media assets were downloaded. For example, one of the files downloaded was from the URL “https://m-resource.doubledowncasino2.com/games/mobile/1.0.1/mobile/assets/art/1136x640/common/slots/coyotemoon/spritesheets/coyotemoon_slot2.png”.

This URL is within the DDC Media Server. This image is included below as Figure 4. Anyone with knowledge of this URL, or who has the ability to obtain this URL, can download the associated image. By way of example, we opened this URL directly in the Chrome browser and were presented with the same image. A screenshot of this behavior is included below as Figure 5.



Figure 4: A sample sprite sheet downloaded by the DDC Android App when the Coyote Moon slot is opened for the first time.

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Figure 5: The aforementioned DDC Media Server URL, opened in the Chrome browser.

c. Android Application Analysis

My team and I used the Android Debug Bridge (“**ADB**”) program, a piece of software distributed by Google and designed to assist with development and debugging of Android applications, to copy the application from the aforementioned Android Test Phone onto a forensics examination workstation.⁸² Android apps are distributed by the application developer in the form of an Android Package (“**APK**”), sometimes referred to as an Android Application Package.⁸³ Using ADB, we were able to extract the APK from my Android Test Phone in the form that it had been downloaded from the Google Play store.

⁸² <https://developer.android.com/studio/command-line/adb.html>

⁸³ https://en.wikipedia.org/wiki/Android_application_package

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1 We inspected the APK using several tools, including tools packaged with the operating
2 system of the forensics workstation⁸⁴ and a piece of software known as ApkTool⁸⁵, which is
3 designed to analyze and decode APK files.

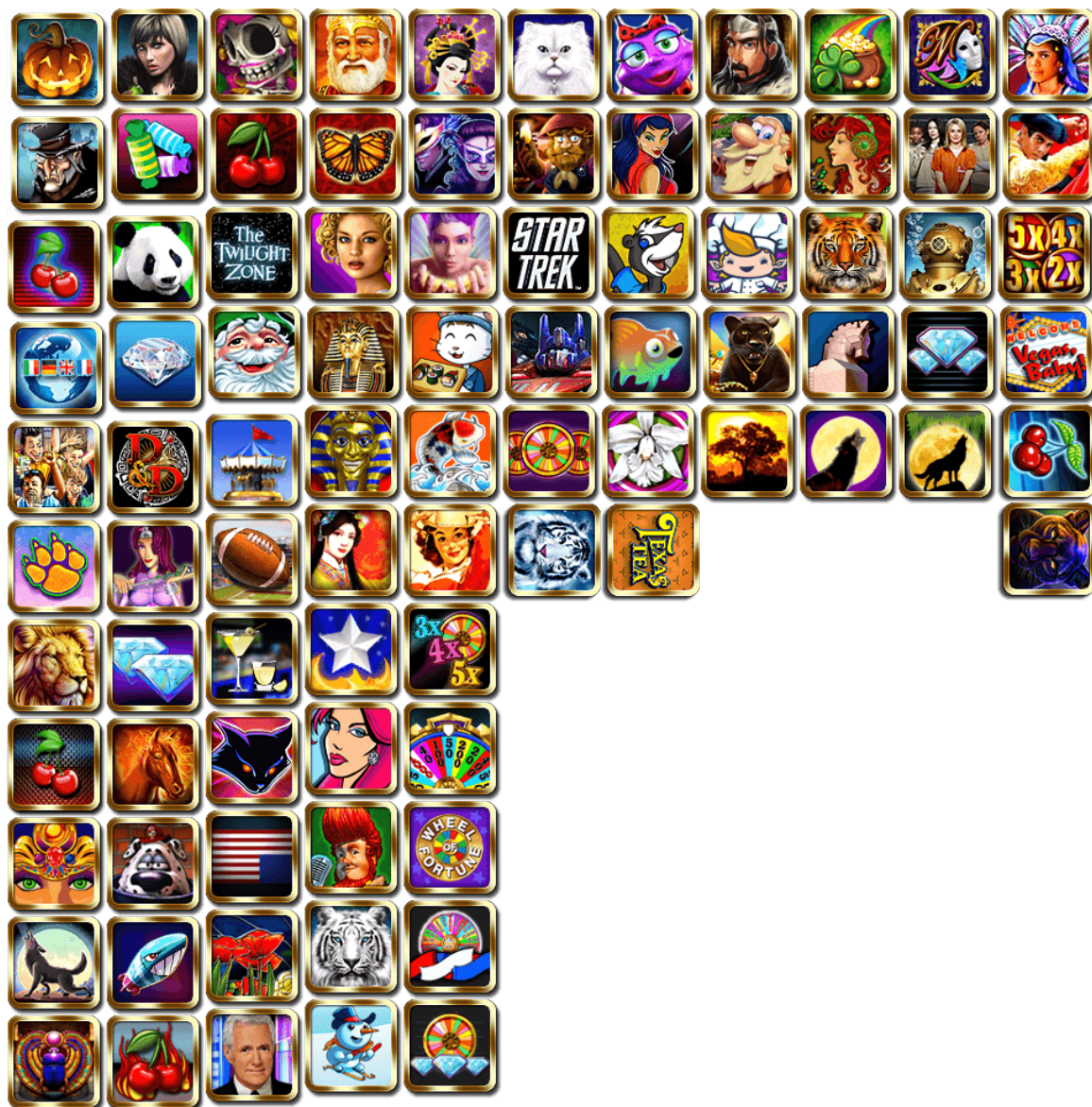
4 Upon opening the APK file, we discovered that the Android resources directory was
5 present, and that several media elements were already included. Notably, we discovered that the
6 directory “assets/mobile/assets/art/1024x768/common/tournaments/spritesheets” within the APK
7 contained the file “tournaments_icons1.png”, and that the related directory
8 “assets/mobile/assets/art/1136x640/common/tournaments/spritesheets” contained a similar file
9 “tournaments_icons1.png”. These two files are present in every copy of Double Down Casino
10 version 3.16.28 downloaded from the Google Play store. They are included below as Figure 6 and
11 Figure 7, respectively.

⁸⁴ Mint Linux 18.2

⁸⁵ <https://ibotpeaches.github.io/Apktool/>

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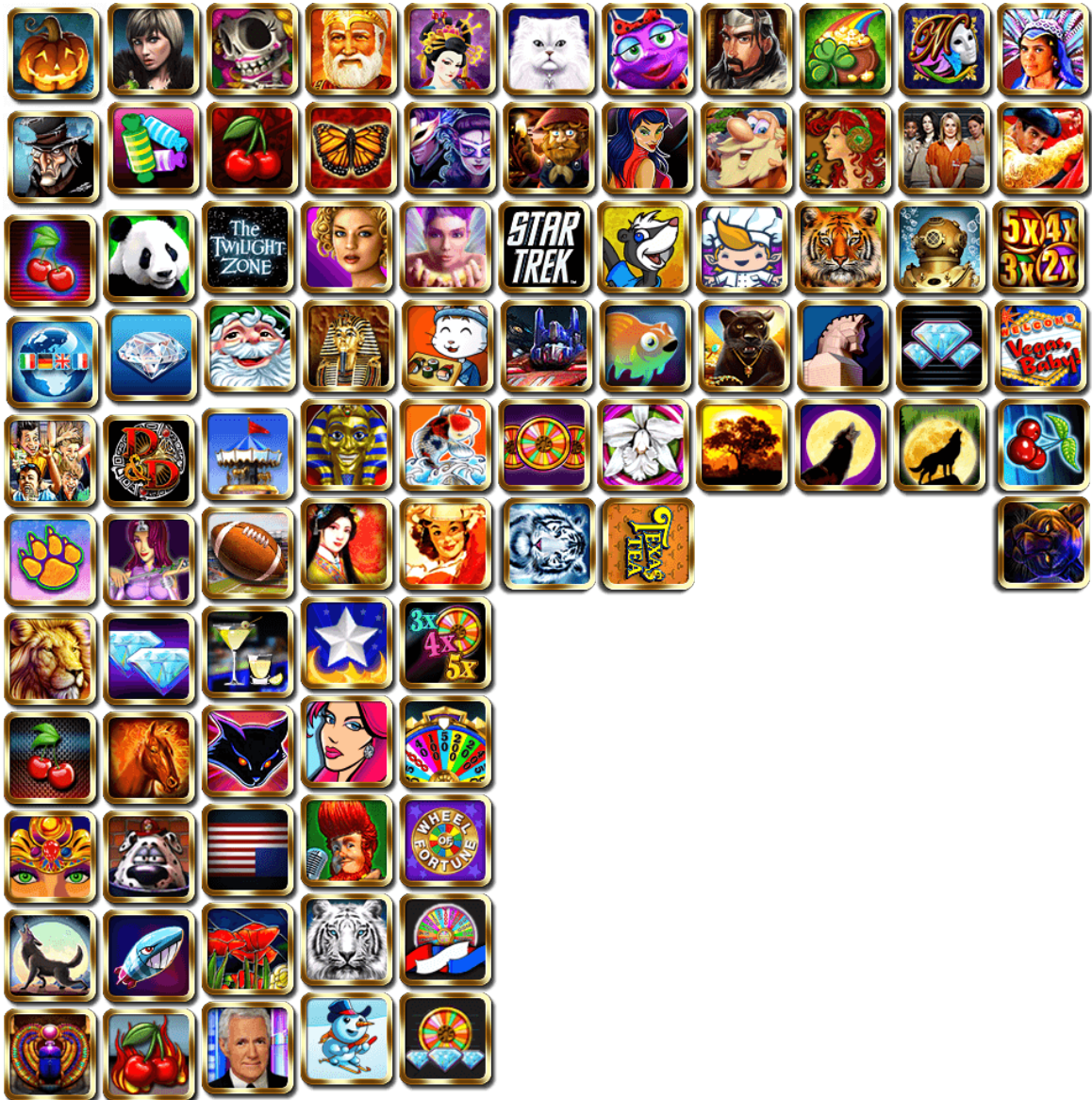


1
2 Figure 6: The “tournaments_icons1.png” file from the “1024x768” directory, as distributed
3 from the Google Play Store with the DDC Android App when it was downloaded.

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1

2

Figure 7: The “tournaments_icons1.png” file from the “1136x640” directory, as distributed from the Google Play Store with the DDC Android App when it was downloaded.

3

4

5

6

7

Based on my familiarity with the DDC Android app, my knowledge of Android App development, and my general knowledge of computers and computer graphics, I believe that the “1024x768” and “1136x640” folders refer to two different sizes and aspect ratios of art in order to

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1 accommodate screens of different sizes. It is not surprising to me that an application developer
2 would feel the need to provide several sizes of art to support various phones and tablets.

3 Within the “assets/” directory we identified the file “bundleAssetCache.db”, which is a SQLite3
4 database file.⁸⁶ SQLite is the standard way that Android apps store structured information.
5 Inspection of the bundleAssetCache.db file showed that it contained the names and location of
6 files stored within the DDC Android app assets folder, along with information about these files,
7 such as their size and whether or not a new version is available. A sample of the information
8 available within this file is included in **Exhibit D**.

9 Within the analysis of network traffic from the DDC Android app, discussed above, we
10 observed that updated replacements for the two “tournaments_icons1.png” files are downloaded
11 to my Test Android Phone when the app is first opened after installation.

12 **d. Stored Copies of GC2 Copyrighted Material Within the**
13 **DDC Android App’s *Resources* Directory**

14 The Android operating system makes a component available called AssetManager that
15 allows an app developer to save and load app assets, such as images, music, and other files.⁸⁷
16 Based on the analysis of the DDC Android app, I can see that the DDC Android app makes use of
17 this capability to load and cache sprite sheets and other assets for future use. This allows game
18 players to load their favorite slot games more quickly, as the large media content does not have to
19 be downloaded from the server. The DDC Android app makes use of an internal database that
20 tracks what media assets have been saved by the app onto the player’s phone. As the DDC Android
21 app is launched, we can observe the app sending a snapshot of the state of this database to the

⁸⁶ <https://www.sqlite.org/index.html>

⁸⁷ <https://developer.android.com/reference/android/content/res/AssetManager.html>

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DDC Gameplay Server. This allows the DDC Gameplay Server to inform the player's app of any media content that has been updated and needs to be replaced.

This is consistent with my observation during testing that, when I closed the DDC Android App and then re-opened it and played a slot machine game that I had earlier played, the media content for that game was not downloaded from the Internet.

e. Availability of the DDC Android App From Alternate App Marketplaces

My team and I also downloaded the versions of the DDC Android App made available by Samsung through their Galaxy Apps store and Amazon through their Amazon Appstore. Together with Google's Play Store, these three app marketplaces collectively form the "**Android App Marketplaces.**" All of the Android App Marketplaces provide apps for Android devices. All three Android App Marketplaces offer the Double Down Casino app and list the version as 3.16.28. In my experience, I would expect all three Android App Marketplaces to provide a substantially similar version of a given app, with minor modifications to support each app marketplace's technical infrastructure, and I found this to be the case with the versions of the DDC Android App offered by each of the Android App Marketplaces.⁸⁸

Each Android App Marketplace provides APKs to the user for use with Android-based devices. The APK for the DDC Android App my team and I downloaded from the Samsung Galaxy App store was byte-for-byte identical to the APK from Google Play that we had already analyzed, as discussed above.

⁸⁸ N.B. There is no requirement for a given App to be listed in multiple stores. As Google Play is the default App Store on most Android devices, it has the most apps offered. Many application developers, including DoubleDown Interactive, elect to list their apps on Samsung's and Amazon's App Stores in order to maximize the number of potential players.

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The APK for the DDC Android App my team and I downloaded from the Amazon Appstore was modified to insert Amazon's payment code. This allows in-game purchases, such as virtual casino chips, to be made through Amazon instead of Google, which allows Amazon to in turn collect a portion of the sale. Beyond this distinction, the DDC Android App distributed by Amazon was substantially similar to the version distributed by Google Play.

f. Locations Where GC2 Copyrighted Material Was Observed

From the time the DDC Android App is installed, through to playing of the slot machine games, I observed transfers of copies of GC2 Copyrighted Material to my Android Test Phone. The DDC Android App contains sprite sheets with GC2 Copyrighted Material, which are available to be copied by any individual who downloaded the DDC Android App. A non-exhaustive listing of such GC2 Copyrighted Material is included in Section V.A.5.a-d, below.

3. DoubleDown Casino App for iOS

Attribute	App Marketplace	App to Phone	Open App 1 st Time on Device	Play Game 1 st Time on Device	Open App 2 nd Time on Device	Play Game 2 nd Time on Device
TERMS OF USE	Link to "License" on App Store	N/A	Computer code with link to Terms of Use automatically downloaded by app. Link to Terms of Use presented in menu.	N/A	Link to Terms of Use presented in menu.	Link to Terms of Use presented in menu.
COMPUTER CODE CONVEYED	N/A	iOS application package sent	N/A	Computer code indicating how images should be assembled from sprite sheets, where they should be placed on the screen, how they should move, etc.	N/A	Computer code redownloaded if necessary.
IMAGES CONVEYED	N/A	N/A	Multiple sprite sheets each containing multiple images.	Multiple sprite sheets each containing multiple images.	Sprite sheets redownloaded if necessary.	Sprite sheets redownloaded if necessary.
ANY IMAGES DISPLAYED	N/A	N/A	Game icons displayed to player.	Game, including game play graphics, displayed.	Game icons displayed to player.	Game, including game play graphics, displayed.
COPYRIGHT OWNERSHIP INFORMATION DISTRIBUTED	N/A	N/A	Link to Terms of Use presented in menu.	Server distributes computer code and graphics files with copyright information. Copyright ownership information displayed while game loads.	Link to Terms of Use presented in menu.	Computer code and graphics files with copyright information redownloaded if necessary. Copyright ownership information displayed while game loads.
POTENTIAL NUMBER OF DEVICES IMPACTED	N/A	Potentially millions of app downloads.	Number of apps opened - potentially millions.	Precise figure needed from IGT.	Precise figure needed from IGT.	Precise figure needed from IGT.

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a. Network Traffic Analysis

In a similar manner to that described above, my team and I configured an iPhone 5S running iOS version 9.2 to interact with the Internet via the Fiddler 4 proxy (the “**Test iPhone**”). We downloaded the DoubleDown Casino app from the Apple “**App Store**” (the “**DDC iOS App**”) and performed testing of the DDC iOS App while monitoring my Test iPhone using Fiddler 4. At the time of this writing, the DDC iOS App is ranked number 33 in Casino games on the App Store.⁸⁹ The app is offered by DoubleDown Interactive LLC and carries a copyright notice on the App Store to DDI.⁹⁰ The App Store also includes a link on the page for the DDC iOS App to the License for the app.⁹¹ The DDC iOS App is listed at version 4.5.1 (in my experience, it is not uncommon for Android and iOS versions of an app to carry different version numbers, as they often need to be updated at different frequencies).⁹²

When my team and I tested the DDC iOS App we observed similar behavior to the DDC Android App. Notably, the DDC iOS App makes use of nearly identical sprite sheets, also downloaded from the DDC Media Server. These sprite sheets contained images and graphics from GC2’s Kitty Glitter, Coyote Moon, and Pharaoh’s Fortune.

Some media downloaded by the DDC iOS App varies slightly in format from the versions downloaded by the DDC Android App. For example, the DDC iOS App makes use of audio encoded in the Advanced Audio Coding format instead of Ogg, and fonts are encoded in the Web Open Font Format instead of TrueType. Both of these technical distinctions are consistent with the differences between iOS and Android devices. That said, the images and graphics are

⁸⁹ <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

⁹⁰ <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

⁹¹ <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

⁹² <https://itunes.apple.com/us/app/doubledown-casino-slots-more/id485126024?mt=8>

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1 substantially the same in the DDC iOS App as in the DDC Android App, and the principles of
2 operation and the general mechanics are the same for both apps in terms of how the apps gather
3 and store gameplay media.

4 In a manner analogous to the DDC Android App, the DDC iOS App downloads sprite
5 sheets onto the Test iPhone from the DDC Media Server and stores them for later use. The DDC
6 iOS App downloads icons for each of Pharaoh's Fortune, Kitty Glitter, and Coyote Moon when
7 the app is run for the first time. When each of the aforementioned games is launched for the first
8 time, the DDC iOS App downloads sprite sheets, JavaScript game play information, audio files,
9 and fonts from the DDC Media Server.

10 **b. iOS Application Analysis**

11 Due to the robust anti-malware and digital rights management systems within Apple
12 hardware, I was unable to obtain a copy of the iOS version of the DDC app for direct analysis.
13 Instead, I have relied on analysis of network traffic to and from a Test iPhone while the DDC iOS
14 App was running, as described above.

15 **c. Stored Copies of GC2 Copyrighted Material Within the**
16 **DDC iOS App**

17 While I was unable to directly examine any media resources associated with the DDC iOS
18 App and resident on my Test iPhone, I was able to repeatedly play the DDC iOS App while
19 connected to the Fiddler 4 network. I observed that when the app is closed and then subsequently
20 reopened, and the player plays a slot machine game that they have previously played, the media
21 content is not re-downloaded. This leads me to the only possible conclusion, namely that the DDC
22 iOS App does store some graphics and images locally on the iOS device in order to speed later

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gameplay. This is consistent with the behavior of DoubleDown Interactive software on Android and on the web, and is further consistent with accepted best practices within the software industry.

d. Locations Where GC2 Copyrighted Material Was Observed

From the time the DDC iOS App is installed, through to playing of the slot machine games, I observed transfers of copies of GC2 Copyrighted Material to my Test iPhone. A non-exhaustive listing of such GC2 Copyrighted Material is included in Section V.A.5.e-h, below.

4. DoubleDown Casino Website

Attribute	Open App 1 st Time	Play Game 1 st Time
TERMS OF USE	Link to Terms of Use presented at bottom of page.	Link to Terms of Use presented at bottom of page.
COMPUTER CODE CONVEYED	Flash files indicating what games are available, including animations and placement of game icons.	Computer code indicating where to place game graphics on the screen, how they should move, and how they should respond to the user.
IMAGES CONVEYED	Multiple Flash files each containing multiple images.	Multiple Flash files each containing multiple images.
ANY IMAGES DISPLAYED	Game icons displayed to player.	Game, including game play graphics, displayed.
COPYRIGHT OWNERSHIP INFORMATION DISTRIBUTED	Link to Terms of Use presented at bottom of page.	Copyright ownership information presented as game loads, based on Flash files from server.
POTENTIAL NUMBER OF DEVICES IMPACTED	Unknown	Unknown.

a. Background

DoubleDown Interactive also makes a playable version of DoubleDown Casino available as a traditional website. Web gaming remains popular and many people enjoy playing games on their computers, at home and at work. The DoubleDown Casino Website (the “**DDC Web App**”)

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1 is available at the time of this writing at www.doubledowncasino2.com. At the time of this writing,
2 www.doubledowncasino.com automatically redirects the user to the new website.

3 **b. Integration with Facebook**

4 The DDC Web App requires that a user sign-in using a Facebook account before they can
5 play the various games offered. The Facebook sign-in provides an easy way for the DDC Web
6 App to track users and retain information about how many chips each player has. Using Facebook
7 for sign-in is a common practice with modern Web applications, as almost everyone has a
8 Facebook account and the user registration process is therefore fast and easy.

9 The DDC Web App is also offered through Facebook's Games section, at
10 apps.facebook.com/doubledowncasino. When my team and I investigated gameplay of the DDC
11 Web App through Facebook, we determined that Facebook was making use of an HTML
12 component known as an IFrame. HTML stands for Hypertext Markup Language and is the
13 computer language used to describe the layout and content of all websites.⁹³ An IFrame is an
14 HTML component that allows for a website to display a different website inside the visible part of
15 the screen. As the name implies, the HTML IFrame element allows the first website to present the
16 second website inside a "frame," much like a picture frame. This allows Facebook to present its
17 website, including its masthead and advertisements, in a space on the screen which surrounds the
18 DDC Web App like a frame. Figure 8 shows the DDC Web App as played from Facebook, note
19 the primary area which displays DoubleDown Casino which is originating from
20 www.doubledowncasino2.com. DDC, in exchange for allowing Facebook to "frame" its offering,

⁹³ <https://en.wikipedia.org/wiki/HTML>

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can make use of Facebook's large user base, some of whom will ideally purchase in-game casino chips; Facebook will presumably collect a margin on these purchases.

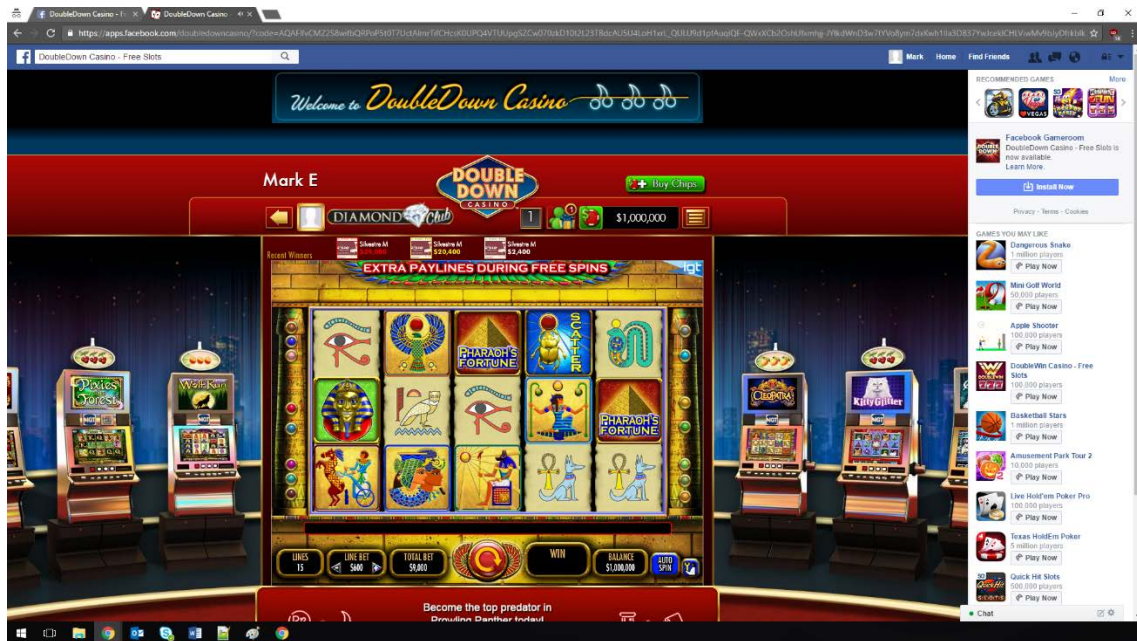


Figure 8: doubledowncasino2.com in an IFrame on apps.facebook.com.

In the paragraphs which follow below, I discuss the DDC Web App. As the version of DoubleDown Casino published through Facebook is simply an IFrame around doubledowncasino2.com, the analysis below for the standalone DDC Web App also provides analysis for the DDC App available for play through Facebook.

c. Network Traffic and Application Analysis

Using the same Fiddler 4 network configuration described above, my team and I analyzed the traffic going to and from the Chrome Web browser⁹⁴ while we played each of Coyote Moon, Kitty Glitter, and Pharaoh's Fortune on the DDC Web App. In addition, we were able to use Web

⁹⁴ Chrome, published by Google, is the most popular web browser in use today.
<https://netmarketshare.com/browser-market-share.aspx>
See <https://www.google.com/chrome/>

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1 software analysis tools built into the Chrome Web browser to inspect certain parts of the DDC
2 Web App. As with the DDC Android App and the DDC iOS App (the “**DDC Mobile Apps**”), the
3 DDC Web App exchanged JSON data with the DDC Gameplay Server about user login and game
4 spins. The DDC Web App also downloaded a large amount of media from d-
5 resource.doubledowncasino2.com. This server is also hosted within Amazon’s Cloudfront
6 Infrastructure.

7 In my experience, it is common practice for developers to designate mobile resources with
8 an “m” and desktop resources with a “d”, which is consistent with the behavior observed here.
9 Further, hosting the desktop media assets within a different Web location allows developers to
10 more easily update game media as changes are required. As both the m-resource and d-resource
11 servers are hosted on AWS Cloudfront under the same domain, and both contain static media assets
12 used by versions of the DDC game, I will refer to them collectively as the DDC Media Server.

13 While playing the Kitty Glitter, Coyote Moon, and Pharaoh’s Fortune slot machine games
14 on the DDC Web App, we identified a number of “SWF” files being downloaded by the Chrome
15 browser while each game loaded. Using the Fiddler 4 system, we were able to extract copies of
16 the SWF files that had been downloaded by the Chrome Web browser while we loaded and played
17 each game.

18 While the DDC Web App is visually similar to the DDC Android App and DDC iOS App,
19 the underlying technology is slightly different. The DDC Web App makes use of a technology
20 known as Flash, sometimes referred to as Shockwave Flash or Small Web Format. Flash is a
21 technology originally developed by Adobe Systems, Inc. that allows for highly-interactive and
22 feature-rich Web applications. While many Web developers are phasing out the use of Flash due

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1 to lack of support on mobile devices, many in-browser games make use of Flash as the underlying
2 technology to display the game. Flash files are commonly identified with the descriptor “SWF.”

3 SWF files contain various images, sounds, and other information that describes where an
4 image should be placed, how it should move, and when it should be replaced with another image.
5 Flash files can also contain fonts and text to be displayed.⁹⁵ It is possible to create what appears
6 to be a moving image using SWF by replacing an image with the next one in the video sequence
7 several times per second. SWF files are readily interpreted by most Web browsers, but are not
8 designed to be viewed in a standalone manner from a computer desktop.

9 With that in mind, my team and I used a utility known as SWFRIP⁹⁶ to extract images,
10 such as PNG images and JPEG images, from the SWF files we had collected using Fiddler. In
11 order to ensure the completeness of our collection, we also used a similar tool called JPXES to
12 perform a concurring analysis.⁹⁷ Within this corpus of extracted PNG and JPEG images were
13 hundreds of artwork and graphic files containing GC2 Copyrighted Material.

14 It should be noted that sprite sheets, as discussed in connection with the DDC Mobile Apps
15 above, are not as widely used within SWF-based applications, and so it was not surprising that the
16 SWF files did not contain sprite sheets. Instead, each sprite image is stored separately within the
17 SWF file.

18 **d. Stored Copies of GC2 Copyrighted Material Within the**
19 **Web Browser Cache**

20 A standard practice within the Web application industry is to allow the Web browser to
21 “cache,” or store static content for some period of time such that when a user returns to a previously

⁹⁵ <https://en.wikipedia.org/wiki/SWF>

⁹⁶ <https://sourceforge.net/projects/swfrip/>

⁹⁷ <https://github.com/jindrapetrik/jpxes-decompiler>

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1 visited website, their browser does not have to download large background images or other media
2 files. This allows the website to load faster. At the time of this writing, the cache for my personal
3 Web browser, which I use daily, is over 400 MB. For comparison, a text version of Shakespeare's
4 *The Tragedy of Romeo and Juliet* is 175 kilobytes, over 2,000 times smaller.⁹⁸

5 Indeed, Web servers routinely communicate information to Web browsers indicating how
6 they should cache certain elements. All Web requests include what are called headers, which form
7 a section of the request where the Web browser and the Web server can exchange information
8 before the content is transmitted. Header information includes the name of the file being
9 transmitted, the protocol used to transmit it, the current date, and information about how the file is
10 encoded. Frequently, additional information is included in headers. A common Web header is
11 "Cache Control", which allows a Web server to instruct the Web browser on how a file should be
12 cached, and for how long. Web headers are standardized in a document known as RFC2616, which
13 is published by the Internet Engineering Task Force.⁹⁹ Additional information about the Cache
14 Control header is readily available online.¹⁰⁰

15 By way of example, at the time of this writing, the main page for www.google.com returns
16 a Cache Control header instructing the Web browser to never cache the page. Google has spent a
17 large amount of engineering time optimizing their home page and wants to be able to update the
18 content quickly. For comparison, www.about.com indicates that the content should be cached by
19 the browser for one hour.

⁹⁸ <https://www.gutenberg.org/cache/epub/1112/pg1112.txt>

⁹⁹ <https://www.ietf.org/rfc/rfc2616.txt>

¹⁰⁰ <https://developer.mozilla.org/en-US/docs/Web/HTTP/Headers/Cache-Control>

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1 Based on what I observed, when a user loads the DDC Web App in their Web browser and
2 clicks on “Slots,” the DDC Web App downloads icons for each slot machine game onto the user’s
3 computer. This occurs before a significant number of SWF files have been downloaded. These slot
4 machine game icons are downloaded as sprite sheets, in a manner similar to the DDC Mobile Apps.

5 One image that is downloaded is “slotlobby_common5.png”, which is downloaded from
6 the DDC Media Server.¹⁰¹ The Cache Control header on this image indicates that it should be
7 stored for the browser for 10 days.¹⁰² For reference, slotlobby_common5.png is included below as
8 Figure 9. This and a number of similar images contain GC2 Copyrighted Material, including the
9 game icons for Pharaoh’s Fortune, Kitty Glitter, and Coyote Moon.

¹⁰¹ At the time of this writing, the full URL is https://d-resource.doubledowncasino2.com/root/1.1.16/desktop/assets/art/1024x768/common/casino/lobbies/spritesheets/slotlobby_common5.png

¹⁰² The web server indicates “Cache-Control: public, max-age=864000” in the header; 864,000 seconds is equivalent to 240 hours or 10 days.

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Figure 9: the slotlobby_common5.png image. Note the Pharaoh's Fortune icon in the middle row on the far left.

The SWF files distributed by the DDC Media Server for the DDC Web App for each of Pharaoh's Fortune, Kitty Glitter, and Coyote Moon are not sent with Cache Control headers. This is commonly caused by server configuration or by neglecting to specify a setting within the AWS control panel for Cloudfront.

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1 In the case where a Cache Control header is not sent, Web browsers will look at other
2 information and determine how long to cache a particular piece of media for.¹⁰³ In my testing, the
3 Chrome browser cached over 50 MB of data while playing each of Coyote Moon, Pharaoh's
4 Fortune, and Kitty Glitter on the DDC Web App for the first time. Further, my team and I
5 determined that Chrome had cached each SWF that was downloaded while the games were being
6 played, and then we identified the location where Chrome stored these files on the local computer.
7 We observed that these files persisted even after Chrome had been closed. A comparison of several
8 SWF files stored by Chrome in this cache indicated that they were byte-for-byte identical to the
9 SWFs originally provided by the DDC Media Server. As expected, analysis of these SWFs
10 revealed that they contain GC2 Copyrighted Material.

11 In either case, it is apparent to me that the Web browser is retaining a significant amount
12 of game media after the game is closed and the user leaves the DDC Web App. This retained
13 material includes files which incorporate GC2 Copyrighted Material.

14 **e. Locations Where GC2 Copyrighted Material Was**
15 **Observed**

16 A collection of images contained within the SWF files that were downloaded when we
17 played Pharaoh's Fortune, Kitty Glitter and Coyote Moon and that contain GC2 Copyrighted
18 Material is provided below.

¹⁰³ RFC 7234, also published by the Internet Engineering Task Force, offers guidance on how browsers should respond to the lack of a cache control header. See <https://tools.ietf.org/html/rfc7234>

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1 **5. Selected Images Transferred From the DDC Media Server While**
2 **Playing the DDC App on iOS, Android, and Web**

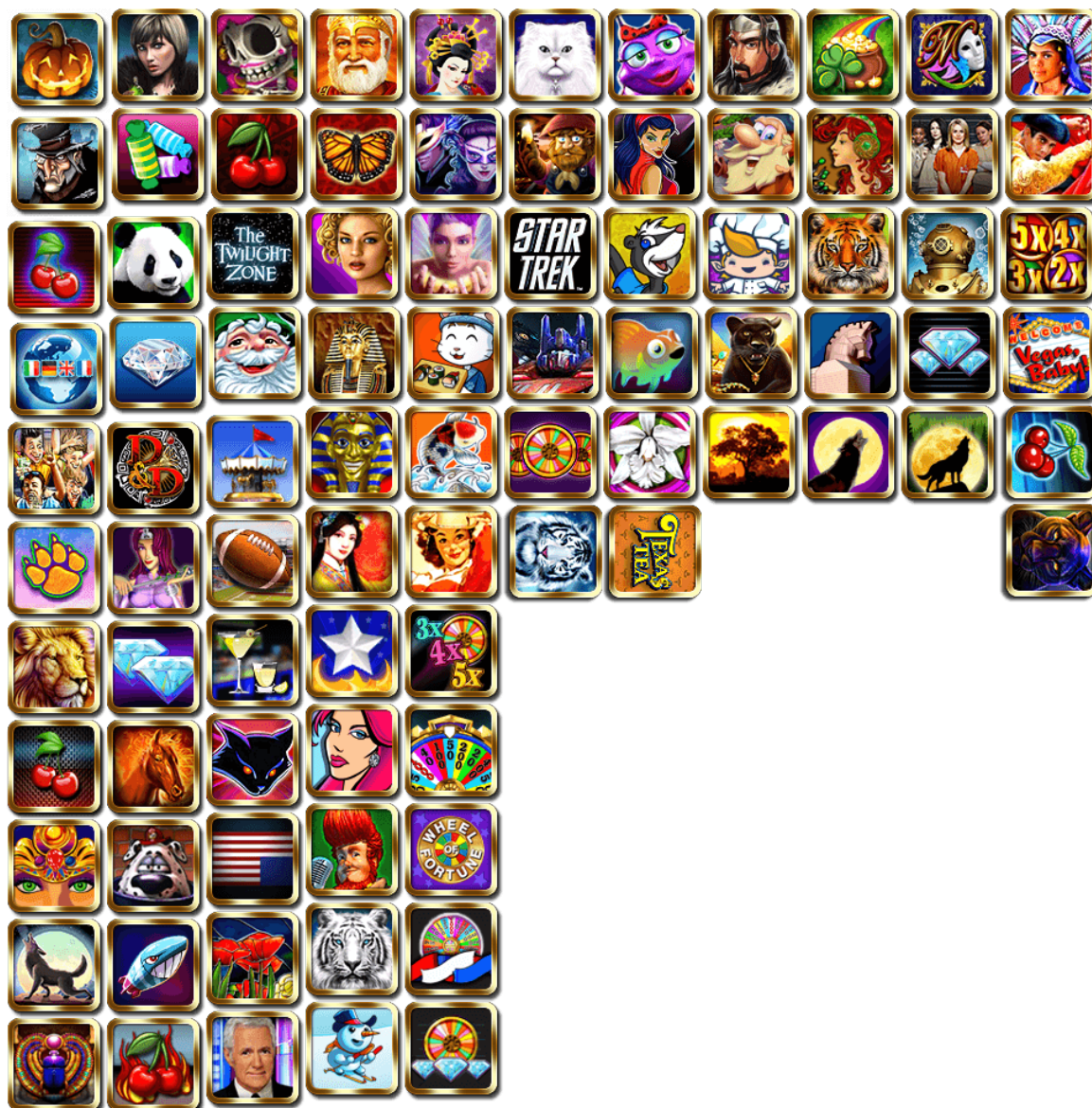
3 **Exhibit F** contains the full set of images that were downloaded by the test devices when
4 the DDC apps were played. The Exhibit contains a total of 1,677 images. Included below in
5 Subsections a-k are selected images from Exhibit F that were downloaded from the DDC Media
6 Server.

7 **a. First Opening the DDC Android App**

8 The following is a selection of the artwork that was downloaded to my Android Test Phone
9 by the DDC Android App when it was opened for the first time after installation:

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1

2

b. Pharaoh's Fortune on the DDC Android App

3

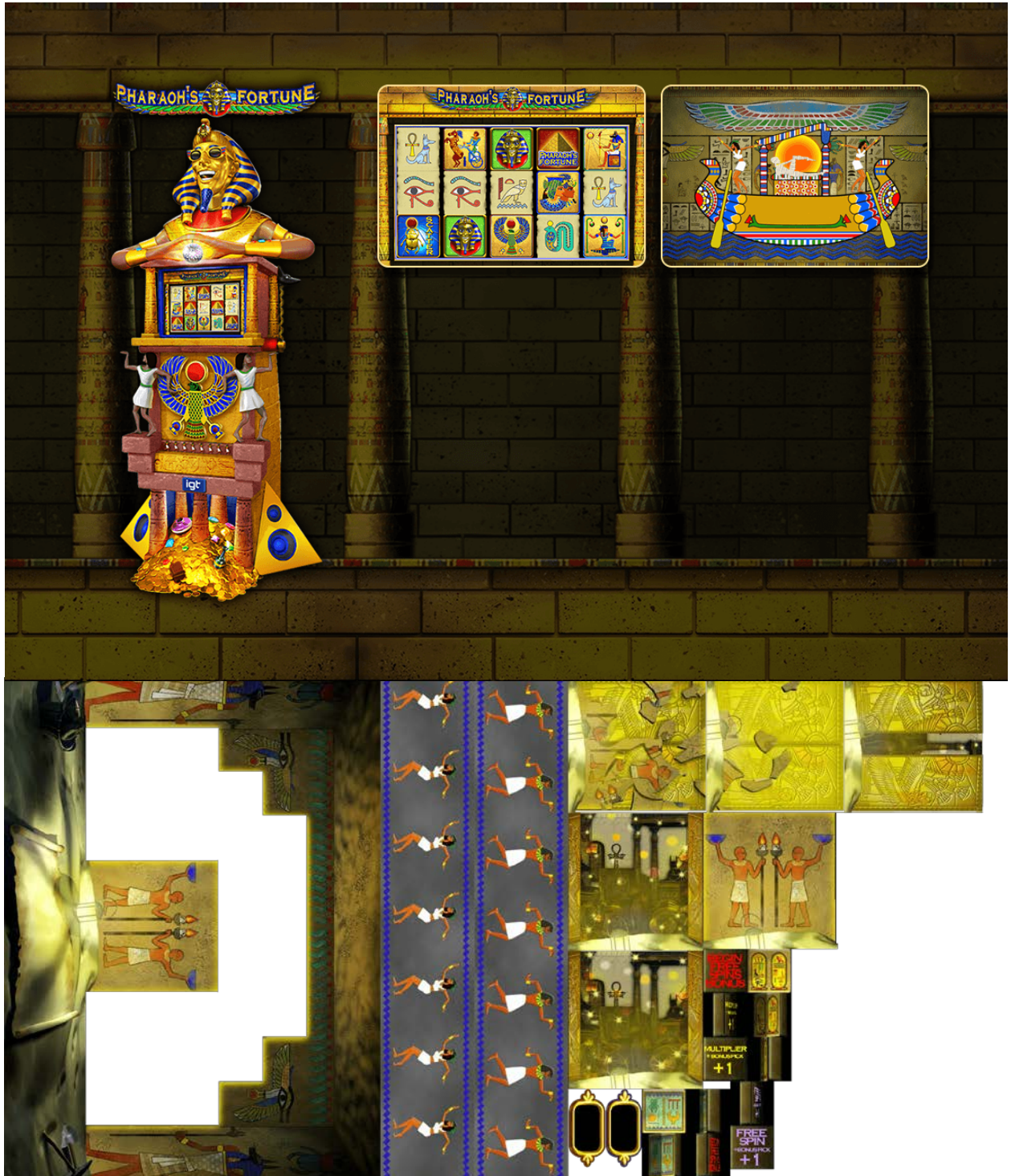
The following is a selection of artwork that was downloaded to my Android Test Phone by the

4

DDC Android App when I played the Pharaoh's Fortune slot machine game for the first time:

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1

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c. Coyote Moon on the DDC Android App

The following is a selection of the artwork that was downloaded to my Android Test Phone by the DDC Android App when I played the Coyote Moon slot machine game for the first time:

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1

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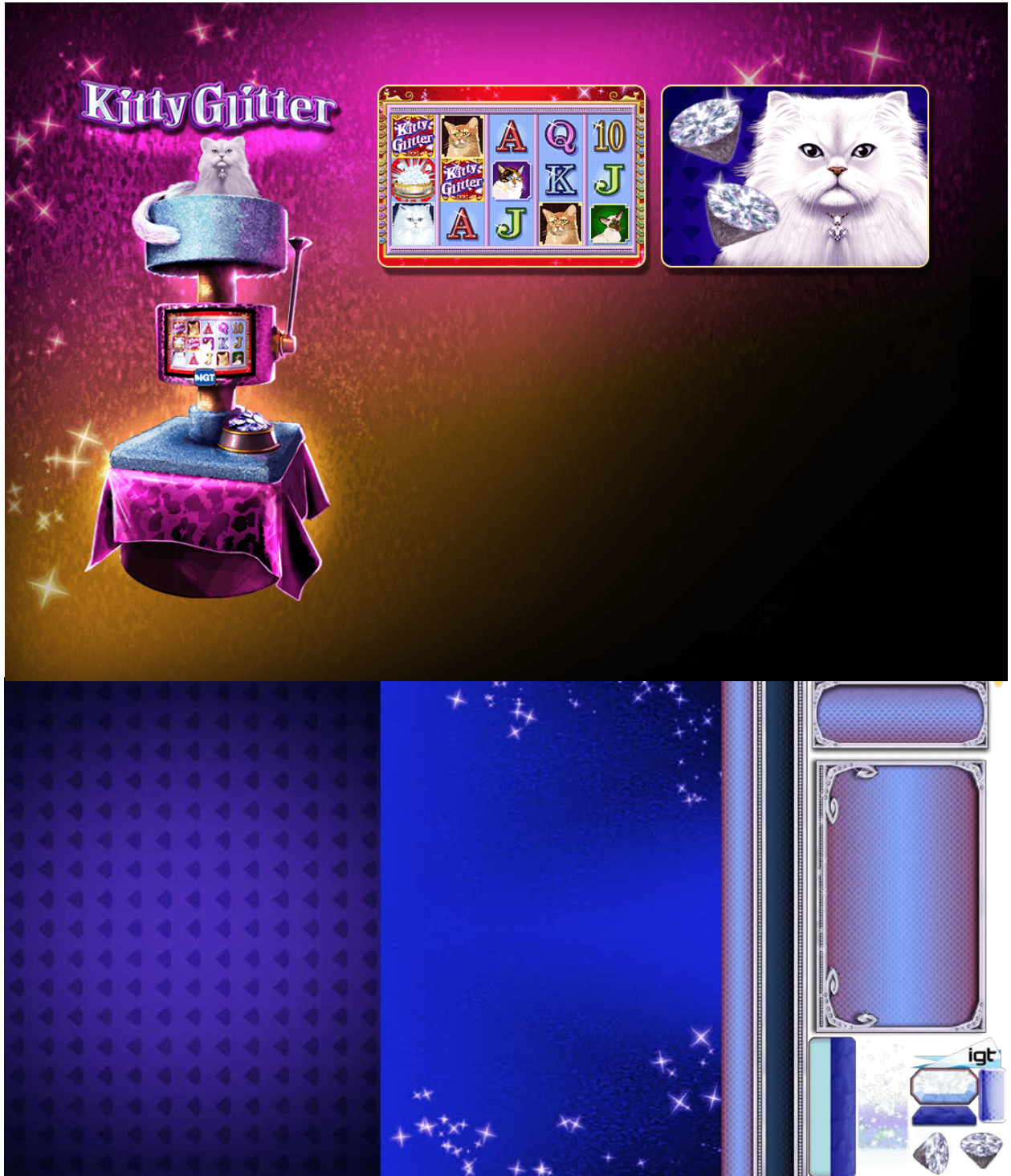


d. Kitty Glitter on the DDC Android App

The following is a selection of artwork that was downloaded to my Android Test Phone by the DDC Android App when I played the Kitty Glitter slot machine game for the first time:

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e. First Opening the DDC iOS App

The following is a selection of the artwork that was downloaded by the DDC iOS App when I opened it on my Test iPhone for the first time after installation:



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f. Pharaoh's Fortune on the DDC iOS App

The following is a selection of artwork that was downloaded to my Test iPhone by the DDC iOS App when I played the Pharaoh's Fortune slot machine game for the first time:

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g. Coyote Moon on the DDC iOS App

The following is a selection of artwork that was downloaded to my Test iPhone by the DDC iOS App when I played the Coyote Moon slot machine game for the first time:

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1

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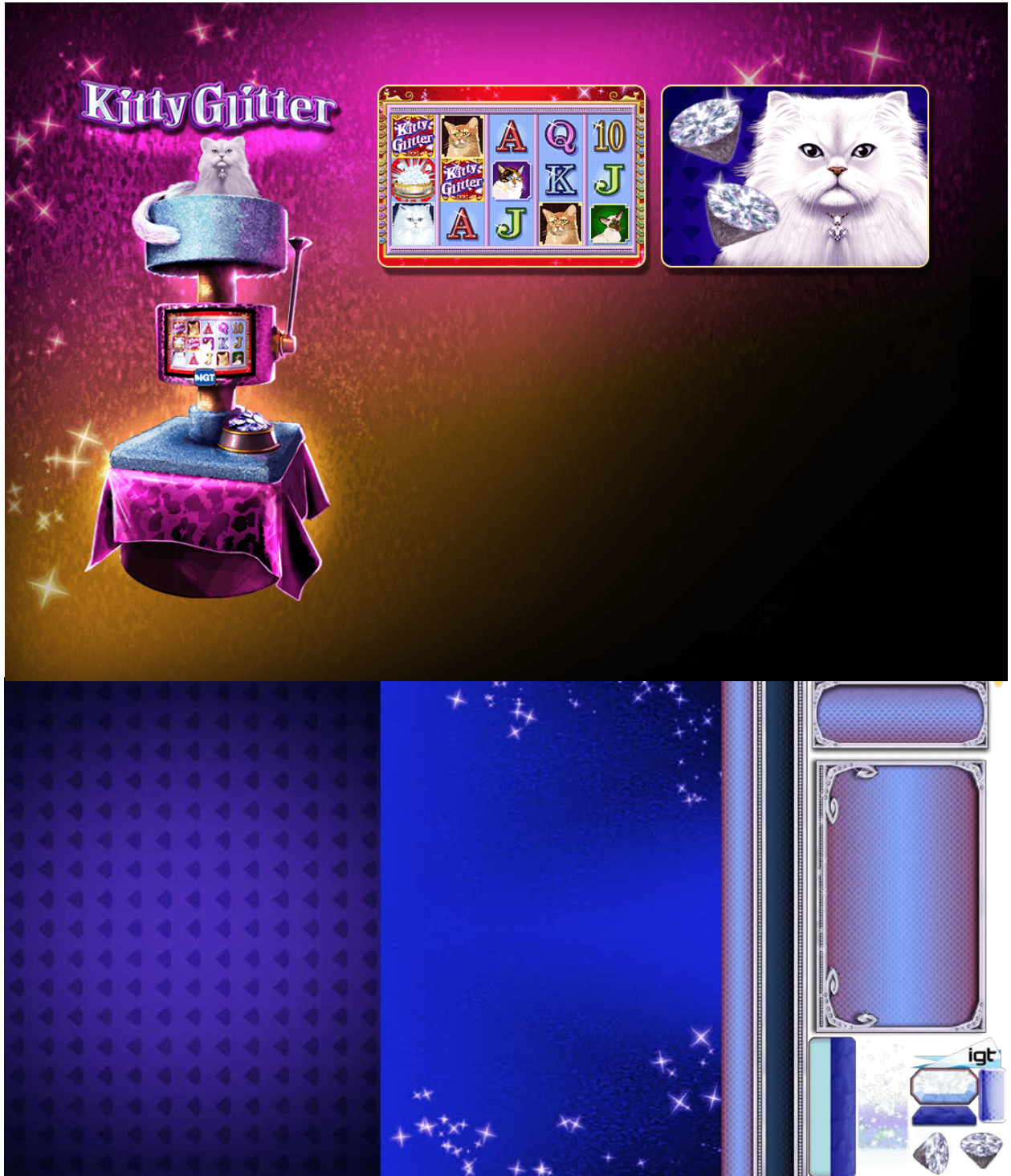


h. Kitty Glitter on the DDC iOS App

The following is a selection of artwork that was downloaded to my Test iPhone by the DDC iOS App when I played the Kitty Glitter slot machine game for the first time:

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The following is a selection of artwork that was downloaded by the Chrome browser to my computer by the DDC Web App when I played the Pharaoh's Fortune slot machine game for the first time:

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1

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1



2

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A close-up photograph of a brick wall. The bricks are light-colored, possibly yellow or tan, with dark mortar joints. The wall is composed of several courses of bricks. At the top of the image, there is a decorative metal railing with a repeating pattern of small, dark, pointed elements. The lighting is somewhat uneven, with a brighter area in the center of the wall.

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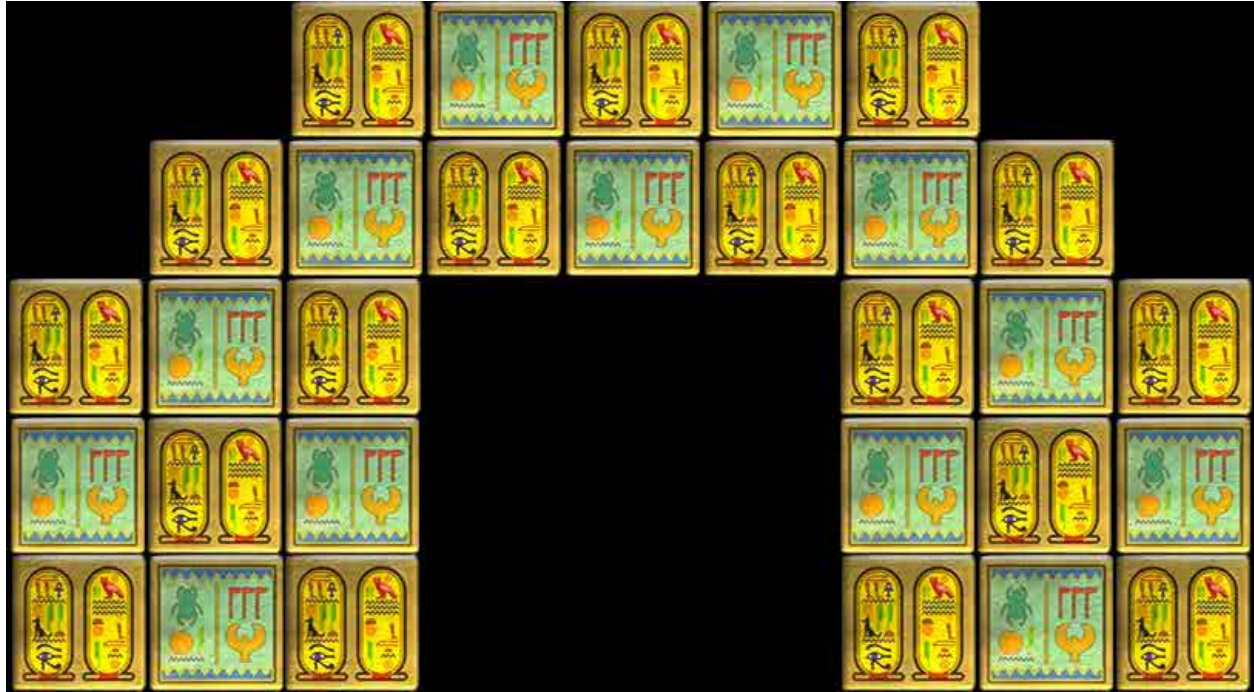
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2



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